

PRE-AVAILABILITY OF A LECTURE TO PROMOTE INTERACTIVITY**BACKGROUND OF THE INVENTION****1. Technical Field:**

The present invention relates generally to
5 computer-aided instruction (CAI). More specifically, the
present invention provides a method, computer program,
and data processing system for an interactive online
discussion of lecture notes.

2. Description of Related Art:

10 Since the introduction of the World Wide Web and the
subsequent commercialization of the Internet, the world
has become a considerably more connected place. No
longer bound to the primitive communications interfaces
of the past, the Internet is now host to a variety of
15 powerful communications media, including interactive
hypertext browsing (the World Wide Web), instant
messaging, streaming video and audio, and multimedia
electronic mail.

Hypertext is a method of organizing textual and
20 graphical information on a computer screen. Information
is organized into "pages," which resemble printed pages
in a book or (perhaps more accurately) printed scrolls
(since a hypertext page can be of any length). The
primary difference between hypertext and the printed
25 word, however, lies in the fact that hypertext pages can
contain links. That is, a portion of a hypertext
document, such as a phrase or a graphic, may be made
sensitive to clicking by the mouse such that when the
user clicks on that portion, the user is directed to a

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new page or a different section of the current page. For instance, it is a common practice to make bibliographic citations into links. When a user clicks on one of these citations, the cited text appears on the screen.

- 5 Hypertext documents are displayed using a program called a "browser."

The largest and best-known repository of hypertext documents is the World Wide Web, a loosely bound collection of publicly accessible hypertext documents stored on computers the world over. The World Wide Web has become the preferred Internet medium for publishable information as well as for providing such interactive features as online shopping—to the extent that the terms Internet and World Wide Web are virtually synonymous to some.

Browsers can download hypertext documents from a server with the HyperText Transfer Protocol (HTTP). HTTP allows a browser to request documents or files from a server and receive a response. In addition, when browser users enter information into a form embedded into a hypertext page, the browser transmits the information to a server using HTTP. Form information can then be passed along to applications residing on the server by way of the Common Gateway Interface (CGI). Those applications can then return a result, which may be written in HTML. Thus, the Internet and Internet technologies such as the World Wide Web combine the precision and permanence of print media with much of the interactivity of oral conversation.

30 It is now commonplace for instructors, particularly at the university level, to upload lecture notes or other study materials to a website for the benefit of their

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students. Such uploaded materials are generally static,
however. They are basically no different than materials
handed out in a classroom on paper. As computers, and in
particular the Internet, provide an ideal platform for
5 interactive study, it is desirable, therefore, to
introduce a level of interactivity into instructors'
lecture notes to enhance the learning experience.

SUMMARY OF THE INVENTION

The present invention provides a method, computer program, and data processing system for promoting an interactive discussion of lecture notes prior to an actual lecture using those notes. An instructor uploads lecture notes for perusal by students. If a student has a question regarding a particular section of the lecture notes, the student can post a question directed to that particular section of the notes. The instructor is alerted that a question has been posted and may respond by modifying or augmenting the lecture notes as appropriate.

BRIEF DESCRIPTION OF THE DRAWINGS

The novel features believed characteristic of the invention are set forth in the appended claims. The invention itself, however, as well as a preferred mode of use, further objectives and advantages thereof, will best be understood by reference to the following detailed description of an illustrative embodiment when read in conjunction with the accompanying drawings, wherein:

Figure 1 is a diagram of a distributed data processing system in which the present invention may be implemented;

Figure 2 is a block diagram of a data processing system suitable for use as a server in a preferred embodiment of the present invention;

Figure 3 is a block diagram of a data processing system suitable for use as a client in a preferred embodiment of the present invention;

Figure 4 is a diagram depicting an overall view of a preferred embodiment of the present invention;

Figures 5-9 are screenshots depicting the operation of a preferred embodiment of the present invention from the perspective of an instructor and a student; and

Figure 10 is a flowchart representation of a process of providing interactive lecture note pre-availability in accordance with a preferred embodiment of the present invention.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

With reference now to the figures, **Figure 1** depicts a pictorial representation of a network of data processing systems in which the present invention may be implemented.

5 Network data processing system **100** is a network of computers in which the present invention may be implemented. Network data processing system **100** contains a network **102**, which is the medium used to provide communications links between various devices and computers
10 connected together within network data processing system **100**. Network **102** may include connections, such as wire, wireless communication links, or fiber optic cables.

In the depicted example, a server **104** is connected to network **102** along with storage unit **106**. In addition,
15 clients **108**, **110**, and **112** also are connected to network **102**. These clients **108**, **110**, and **112** may be, for example, personal computers or network computers. In the depicted example, server **104** provides data, such as boot files, operating system images, and applications to clients
20 **108-112**. Clients **108**, **110**, and **112** are clients to server **104**. Network data processing system **100** may include additional servers, clients, and other devices not shown. In the depicted example, network data processing system **100** is the Internet with network **102** representing a
25 worldwide collection of networks and gateways that use the TCP/IP suite of protocols to communicate with one another. At the heart of the Internet is a backbone of high-speed data communication lines between major nodes or host computers, consisting of thousands of commercial,

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government, educational and other computer systems that route data and messages. Of course, network data processing system **100** also may be implemented as a number of different types of networks, such as for example, an
5 intranet, a local area network (LAN), a wireless network, or a wide area network (WAN). **Figure 1** is intended as an example, and not as an architectural limitation for the present invention.

Referring to **Figure 2**, a block diagram of a data
10 processing system that may be implemented as a server, such as server **104** in **Figure 1**, is depicted in accordance with a preferred embodiment of the present invention. Data processing system **200** may be a symmetric multiprocessor (SMP) system including a plurality of
15 processors **202** and **204** connected to system bus **206**. Alternatively, a single processor system may be employed. Also connected to system bus **206** is memory controller/cache **208**, which provides an interface to local memory **209**. I/O bus bridge **210** is connected to system bus
20 **206** and provides an interface to I/O bus **212**. Memory controller/cache **208** and I/O bus bridge **210** may be integrated as depicted.

Peripheral component interconnect (PCI) bus bridge
214 connected to I/O bus **212** provides an interface to PCI
25 local bus **216**. A number of modems may be connected to PCI bus **216**. Typical PCI bus implementations will support four PCI expansion slots or add-in connectors. Communications links to network computers **108-112** in
Figure 1 may be provided through modem **218** and network
30 adapter **220** connected to PCI local bus **216** through add-in boards.

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Additional PCI bus bridges **222** and **224** provide interfaces for additional PCI buses **226** and **228**, from which additional modems or network adapters may be supported. In this manner, data processing system **200** allows connections to multiple network computers. A memory-mapped graphics adapter **230** and hard disk **232** may also be connected to I/O bus **212** as depicted, either directly or indirectly.

Those of ordinary skill in the art will appreciate that the hardware depicted in **Figure 2** may vary. For example, other peripheral devices, such as optical disk drives and the like, also may be used in addition to or in place of the hardware depicted. The depicted example is not meant to imply architectural limitations with respect to the present invention.

The data processing system depicted in **Figure 2** may be, for example, an IBM eServer pSeries system, a product of International Business Machines Corporation in Armonk, New York, running the Advanced Interactive Executive (AIX) or Linux operating system.

With reference now to **Figure 3**, a block diagram illustrating a data processing system is depicted in which the present invention may be implemented. Data processing system **300** is an example of a client computer. Data processing system **300** employs a peripheral component interconnect (PCI) local bus architecture. Although the depicted example employs a PCI bus, other bus architectures such as Accelerated Graphics Port (AGP) and Industry Standard Architecture (ISA) may be used. Processor **302** and main memory **304** are connected to PCI local bus **306** through PCI bridge **308**. PCI bridge **308** also may include an integrated memory controller and cache

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memory for processor **302**. Additional connections to PCI local bus **306** may be made through direct component interconnection or through add-in boards. In the depicted example, local area network (LAN) adapter **310**, SCSI host bus adapter **312**, and expansion bus interface **314** are connected to PCI local bus **306** by direct component connection. In contrast, audio adapter **316**, graphics adapter **318**, and audio/video adapter **319** are connected to PCI local bus **306** by add-in boards inserted into expansion slots. Expansion bus interface **314** provides a connection for a keyboard and mouse adapter **320**, modem **322**, and additional memory **324**. Small computer system interface (SCSI) host bus adapter **312** provides a connection for hard disk drive **326**, tape drive **328**, and CD-ROM drive **330**. Typical PCI local bus implementations will support three or four PCI expansion slots or add-in connectors.

An operating system runs on processor **302** and is used to coordinate and provide control of various components within data processing system **300** in **Figure 3**. The operating system may be a commercially available operating system, such as Windows 2000, which is available from Microsoft Corporation. An object oriented programming system such as Java may run in conjunction with the operating system and provide calls to the operating system from Java programs or applications executing on data processing system **300**. "Java" is a trademark of Sun Microsystems, Inc. Instructions for the operating system, the object-oriented operating system, and applications or programs are located on storage devices, such as hard disk drive **326**, and may be loaded into main memory **304** for execution by processor **302**.

Those of ordinary skill in the art will appreciate that the hardware in **Figure 3** may vary depending on the implementation. Other internal hardware or peripheral devices, such as flash ROM (or equivalent nonvolatile memory) or optical disk drives and the like, may be used in addition to or in place of the hardware depicted in **Figure 3**. Also, the processes of the present invention may be applied to a multiprocessor data processing system.

As another example, data processing system **300** may be a stand-alone system configured to be bootable without relying on some type of network communication interface, whether or not data processing system **300** comprises some type of network communication interface. As a further example, data processing system **300** may be a Personal Digital Assistant (PDA) device, which is configured with ROM and/or flash ROM in order to provide non-volatile memory for storing operating system files and/or user-generated data.

The depicted example in **Figure 3** and above-described examples are not meant to imply architectural limitations. For example, data processing system **300** also may be a notebook computer or hand held computer in addition to taking the form of a PDA. Data processing system **300** also may be a kiosk or a Web appliance.

The present invention provides a method, computer program, and data processing system for promoting an interactive discussion of a set of lecture notes prior to an actual lecture using those notes. For the purposes of this application, the term "lecture" encompasses any type of instructional speech, including lectures, presentations, talks, seminars, or the like. "Lecture

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notes" may comprise text, graphics, audio, or any other suitable instructional media. One of ordinary skill in the art will appreciate that the processes of the present invention may be applied to electronic documents of all
 5 kinds, not simply those that contain lecture note material.

Figure 4 is a diagram depicting an overall view of a lecture notes pre-availability system in accordance with a preferred embodiment of the present invention. Student
 10 clients **400** are client computers operated by attendees of the lecture (hereinafter "students"). Instructor client **402** is a client operated by the lecturer (hereinafter "instructor"). Student clients **400** and instructor client **402** are all connected to Internet **404** and interact with
 15 lecture notes server **406**, which is preferably some kind of web server. Lecture notes server **406** stores lecture notes and students' questions in lecture notes repository **408**. Lecture notes repository **408** is

In a preferred embodiment of the invention,
 20 instructor client **402** uploads a set of lecture notes to lecture notes server **406**. Lecture notes server **406** stores the lecture notes in lecture notes repository **408**. Student clients **400** may register a login account with lecture notes server **406** (e.g., a standard username and
 25 password) and log into lecture notes server **406** to download and display to a student, lecture attendee, etc. the stored the notes stored in notes repository **408**.

The notes are divided into sections, with each section, with each section preferably covering a separate
 30 subtopic. If a student/lecture attendee has a question about a particular section, he/she may post a question

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with his/her respective one of student clients **400** to be transmitted to lecture notes server **406**. Instructor client **402** will be notified (e.g., through an electronic mail or instant message) that a question has been posted, and instructor client **402** will download the lecture notes, annotated with students' questions, from lecture notes server **406** for viewing. The instructor may then edit the lecture notes to address the point(s) raised in the question(s) and upload the revised notes to lecture notes server **406** to replace the original notes in notes repository **408**. Before the actual lecture is given, instructor client **402** will preferably download the revised lecture notes for use by the instructor during the lecture.

Figures 5-9 are screenshots depicting the operation of a preferred embodiment of the present invention from the perspective of a student and an instructor. **Figure 5** depicts a web browser **500** displaying a set of lecture notes to a student logged into lecture notes server **406** from a client computer. The lecture notes were prepared and uploaded by an instructor. The lecture notes are divided into sections, such as section **502**. At the end of each section, the student is provided a link, such as link **504**, so that the student may ask a question regarding the preceding section.

Clicking on link **504** causes the question submission screen shown in **Figure 6** to appear. An entry form **600** is provided for the student to enter a question regarding a particular section. The student clicks submit button **602** to submit the question for consideration by the instructor.

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The instructor will then be alerted that the question has been submitted. This may take place using electronic mail, instant messaging, or any other suitable notification method. **Figure 7** depicts an alert window

5 **700** produced by the instructor's electronic mail or instant messaging program to notify the instructor that a question has been posted.

The instructor can then log into the lecture notes server and view the lecture notes with the posted
10 questions embedded. **Figure 8** depicts a set of lecture notes with a posted question **800** embedded into the page. An edit control **802** may be clicked by the instructor to allow editing of the section to which posted question **800** refers. In this way, the lecture notes may be added to
15 so as to address the subject material of the posted questions.

Figure 9 depicts an editing screen for editing the section from which a posted question is derived. Heading control **900** allows the heading of the section to be
20 edited. Section editing control **902** is a textarea control containing the text of the section to be edited. The instructor can edit the text by making changes in section editing control **902** and clicking submit control **904**.

25 **Figure 10** is a flowchart representation of a preferred embodiment of the present invention. First, an instructor prepares lecture materials and uploads them to the lecture notes server (step **1000**). A student can register for access to the lecture content (step **1002**).
30 Once registered, the student may login to access the lecture content (step **1004**).

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If the student has not registered (step **1006:No**), access will be denied (step **1008**) and the student will be advised to register to view content (step **1010**). If the student has registered (step **1006:Yes**), at least a
5 section of lecture content will be displayed for the student (step **1012**). If the student has no questions regarding the displayed section (step **1014:No**), the student may proceed to the next section (step **1026**).

If the student has a question about a given section,
10 however, the student may post the question to the lecture notes server (step **1016**). The instructor will be alerted that the question has been posted (step **1018**).

When the instructor views the lecture notes, they will be modified so as to include the posted questions,
15 and the instructor will be given a change to edit the lecture notes to address the question (step **1020**). Meanwhile, if there is no additional content for the student to view (step **1022:Yes**), the process ends. If there is additional content (step **1022:No**), the student
20 may move on to the next section (step **1024:Yes, 1026**) or post additional questions regarding the current section (step **1024:No, 1014**).

It is important to note that while the present invention has been described in the context of a fully
25 functioning data processing system, those of ordinary skill in the art will appreciate that the processes of the present invention are capable of being distributed in the form of a computer readable medium of instructions and a variety of forms and that the present invention
30 applies equally regardless of the particular type of signal bearing media actually used to carry out the

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distribution. Examples of computer readable media include recordable-type media, such as a floppy disk, a hard disk drive, a RAM, CD-ROMs, DVD-ROMs, and transmission-type media, such as digital and analog
5 communications links, wired or wireless communications links using transmission forms, such as, for example, radio frequency and light wave transmissions. The computer readable media may take the form of coded formats that are decoded for actual use in a particular
10 data processing system.

The description of the present invention has been presented for purposes of illustration and description, and is not intended to be exhaustive or limited to the invention in the form disclosed. Many modifications and
15 variations will be apparent to those of ordinary skill in the art. The embodiment was chosen and described in order to best explain the principles of the invention, the practical application, and to enable others of ordinary skill in the art to understand the invention for
20 various embodiments with various modifications as are suited to the particular use contemplated.